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E BOND M/AU

L1 1054 S BOND A?/AU
L2 19 S L1 AND 1981/PY
L3 3 S L2 AND ELECTROAN?/SO
L4 25 S L1 AND 1975/PY
L5 3 S L4 AND ANAL?/SO AND 47/SO
L6 119 S LOCATELLI C?/AU
L7 7 S L6 AND 1988/PY
L8 2 S L7 AND (ALTERNATING CURRENT OR A C)
L9 7 S L1 AND 1976/PY AND ANAL?/SO AND 48/SO
L10 1 S L9 AND RUZIC I?/AU
L11 1 S L6 AND 1987/PY AND TALANTA/SO
L12 120 S L1, L6 AND (ALTERNATING CURRENT OR A C)
L13 123 S L3, L5, L8, L10-12

=> d bib, ab 1-123 113

L13 ANSWER 9 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 128:146624 CA
TI Microcomputer-based instrumentation for multi-frequency Fourier transform
alternating current (admittance and impedance) voltammetry
AU Hazi, Jenö; Elton, Darrell M.; Czerwinski, W. Alexander; Schiewe, Jörg;
Vicente-Beckett, Victoria A.; **Bond, Alan M.**
CS School of Chemistry, La Trobe University, Bundoora, Vic., 3083, Australia
SO Journal of Electroanalytical Chemistry (1997), 437(1-2), 1-15
AB Microcomputer-based instrumentation has been developed which enables high
quality Fourier transform a.c. admittance and impedance voltammograms to be
obtained over a wide range of frequencies and d.c. potentials. A carefully
chosen phase-optimized small amplitude alternating potential waveform contg.
sets of frequencies which avoid harmonic or intermodular interference are
periodically superimposed onto a staircase d.c. ramped voltage.
Considerable versatility is available in the choice of the excitation
waveform and the d.c. ramp. Frequencies in the range of about 50 to 50 000
Hz may be applied at many potentials in any given expt. Data are reported
at both macro- and microelectrodes to illustrate the excellent signal-to-
noise ratios that can be obtained under conditions commonly encountered in
mechanistic or anal. applications of voltammetric techniques. In the anal.
context, linear plots of peak height vs. concn. were obtained when using the
admittance mode for both redn. of $[\text{Fe}(\text{CN})_6]^{3-}$ at a carbon fiber
microelectrode and redn. of Cd^{2+} at a hanging mercury drop electrode. Many
mechanistic and anal. applications presently assocd. with single frequency
linear sweep and cyclic a.c. voltammetry are expected to be enhanced when
the instrumentation is used in the multi-frequency mode.

L13 ANSWER 27 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 108:50718 CA
TI Determination of chromium(VI) in dialysis fluids by **alternating current** and
differential pulse voltammetry
AU **Locatelli, Clinio**; Fagioli, Francesco
CS Dep. Chem., Univ. Ferrara, Ferrara, I-44100, Italy
SO Mikrokimika Acta (1987), Volume Date 1986, 3(5-6), 269-76
AB A.c. and differential pulse voltammetry are employed for the detn. of Cr(VI)
in dialysis fluids, using 0.1 mol/L dibasic ammonium citrate as supporting
electrolyte (pH 5.9). A 3-electrode cell was used. The working electrode

was a long-lasting sessile-drop Hg electrode with a drop time of 240-300 s. Precision, expressed as relative std. deviation (sr%), and accuracy, expressed as relative recovery (R%), are also reported.

L13 ANSWER 28 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 107:126123 CA
TI Second harmonic a.c. anodic stripping voltammetry of metals at trace level. Simultaneous determination of lead and thallium, and bismuth and antimony
AU Locatelli, C.; Fagioli, F.; Bighi, C.; Garai, T.
CS Dep. Chem., Univ. Ferrara, Ferrara, 44100, Italy
SO Talanta (1987), 34(6), 529-33
AB Pairs of elements with very small differences in their half-wave potentials were detd. at trace levels by second harmonic a.c. anodic stripping voltammetry. The simultaneous detn. of lead and thallium as well as that of bismuth and antimony in 1M hydrochloric acid as supporting electrolyte was found to be possible in the range of concn. ratios: $7:1 \geq \text{CPb:CTl} \geq 1:36$ and $45:1 \geq \text{CSb:CBI} \geq 1:35$, with <5% relative error due to mutual interference. The limit of detection was $\sim 10^{-8}\text{M}$ for all four elements, and the precision and error were 2-3%. The simultaneous detn. of these metals in mixts. with concn. ratios outside the quoted ranges is still feasible by the std.-addn. technique.

L13 ANSWER 29 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 106:222827 CA
TI A systematic approach to faradaic current, charging current and phase angle measurement by digital **alternating current** polarography
AU Bond, A. M.; Heritage, I. D.
CS Div. Chem. Phys. Sci., Deakin Univ., Waurin Ponds, 3217, Australia
SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1987), 222(1-2), 35-44
AB In microprocessor-based digital, a.c. polarog., the simultaneous measurement of total a.c. polarograms at 10° phase angle intervals allows the calcn. of both the faradaic and charging current components of the exptl. as well as their phase-angle relation to the applied potential. The data evaluation procedure is based upon extrapolation of the background current at potentials removed from the faradaic process so as to enable the charging current to be calcd. in the presence of the faradaic current. The faradaic current can then be calcd. by subtraction of the charging current. Curve fitting of the sepd. faradaic and charging current functions to an equation of the kind $Y = A \cdot \sin(X + \phi)$, where ϕ is the phase angle, enables interpolated phase angles for the faradaic response to be calcd. with an accuracy of better than 1° . Data are presented for the process $[\text{Fe}(\text{ox})_3]^{3-} + e^- \rightleftharpoons [\text{Fe}(\text{ox})_3]^{4-}$ (ox = oxalate) at a Hg electrode and provide a frequency-independent phase angle of $(45 \pm 1)^\circ$ as expected theor. for a reversible process. The 2-electron redn. of Cu(II) in 1M NaNO₃ to produce a Cu amalgam exhibits the theor. frequency-dependent phase angle of $<45^\circ$ expected for a quasi-reversible process. The microprocessor-based digital a.c. method of phase-angle measurement is considered to be superior to conventional analog approaches, but not as accurate as the fast fourier transform method developed by D. E. Smith et al. with more elaborate and expensive lab. computer-based instrumentation.

ms in hnd
9053736

L13 ANSWER 30 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 106:127823 CA
TI Application of transient electrochemical techniques to inlaid ultra-microelectrodes. Assessment of fabrication quality
AU Thormann, Wolfgang; Bond, Alan M.
CS Div. Chem. Phys. Sci., Deakin Univ., Victoria, 3217, Australia

2055-150
205/15/150

SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry
(1987), 218(1-2), 187-96

AB The reversible 1-electron oxidn. of ferrocene in MeCN at arrays of microdisk electrodes, linear microelectrodes and very thin ring electrodes prepd. with a uniform glass seal or a layer of epoxy resin between the conductor and the glass support was investigated in the ms and sub-ms time domains by a range of transient electrochem. techniques and chronocoulometry. The data were compared with that from a conventional-sized disk electrode (0.8 mm radius) and illustrate the significant advantages of using ultra-microelectrodes with transient voltammetric techniques provided that the electrodes are correctly constructed. The responses of the transient electrochem. techniques of differential pulse, sq. wave and a.c. voltammetry, as well as chronocoulometry are strongly influenced by irregularities originating in the construction of inlaid microelectrodes of microscopic dimensions of $<1 \mu\text{m}$. Imperfectly prepd. electrodes with cracks in the glass seal or with thick sealing layers of epoxy resin exhibit undesirable background currents which prevent their use for measurements in short time regimes.

L13 ANSWER 33 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 105:34722 CA
TI Trace-metal determination by second-harmonic **alternating-current** anodic stripping voltammetry
AU Locatelli, Clinio; Fagioli, Francesco; Bigli, Corrado; Garai, Tibor
CS Dep. Chem., Univ. Ferrara, Ferrara, 44100, Italy
SO Talanta (1986), 33(3), 243-7
AB Second-harmonic a.c. voltammetry can be used for the sequential detn. of 2 electroactive species having very similar half-wave potentials ($\Delta E_{1/2} < 50 \text{ mV}$). Since the concns. of such metals in samples of special interest are often at trace levels, for their detn. second-harmonic a.c. voltammetry (extremely selective but not sufficiently sensitive) can usefully be combined with the anodic-stripping method, which has a very high anal. sensitivity. The detn. of Sn and Pb as well as of In and Cd in 1M HCl is described. The half-wave potentials are only 35 and 45 mV apart, resp., for these systems. A 3-electrode cell was used with a long-lasting sessile-drop Hg electrode as the working electrode, with a drop-time of 240-300 s. The detection limit was 10-8M for all 4 elements studied. The precision expressed as the relative std. deviation was 2-3% and the relative error was 1-2%.

L13 ANSWER 37 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 103:188635 CA
TI Determination of metals by second-harmonic **alternating-current** voltammetry with a semi-stationary mercury electrode
AU Locatelli, Clinio; Fagioli, Francesco; Bigli, Corrado; Garai, Tibor
CS Dep. Chem., Univ. Ferrara, Ferrara, 44100, Italy
SO Talanta (1985), 32(7), 539-43
AB The simultaneous detn. of Sn (II) and Pb (II) as well as of In(III) and Cd (II) by 2nd-harmonic a.c. voltammetry using a semistationary Hg electrode with a drop-time of 240-300 s (the long-lasting sessile-drop Hg electrode) was investigated. Under the best exptl. conditions, concn. ratios in the ranges $1:12 \leq c(\text{Sn}):c(\text{Pb}) \leq 15:1$ and $1:15 \leq c(\text{In}):c(\text{Cd}) \leq 15:1$ can be detd.

L13 ANSWER 38 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 103:188587 CA
TI Voltammetry at linear gold and platinum microelectrode arrays produced by lithographic techniques
AU Thormann, Wolfgang; Van den Bosch, Peter; Bond, Alan M.
CS Div. Chem. Phys. Sci., Deakin Univ., Victoria, 3217, Australia

SO Analytical Chemistry (1985), 57(14), 2764-70
AB Au and Pt linear voltammetric microelectrodes arrays constructed by lithog. technol. were developed. This technol. enables great versatility with respect to no. of sensing elements (3-256 used in this work), size, and spacing. Individual elements are geometrically equiv. to circular disk ultramicroelectrodes of 0.6-5- μ m radius. Voltammetric measurements may be made at individual sensing elements, part of the array, or the total linear ensemble. The response of the array is close, but not exactly equal, to the sum of the individual sensing elements. A steady-state voltammogram is obtained with current in the microampere range (oxidn. of 1 mM ferrocene in MeCN) for the larger arrays. All constructed ensembles exhibit microelectrodes characteristic that permit measurements in the absence of deliberately added electrolyte. Addnl., transient techniques such as a.c. and pulse voltammetry can be applied with millisecond pulse widths in systems with supporting electrolyte and with high resistance. Com. available instrumentation can readily be used with the larger arrays, as is demonstrated with various electrochem. techniques, such as chronocoulometry.

L13 ANSWER 46 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 99:112935 CA
TI Microprocessor-controlled instrument for the simultaneous generation of square wave, **alternating current**, direct current, and pulse polarograms
AU Anderson, J. E.; **Bond, A. M.**
CS Div. Chem. Phys. Sci., Deakin Univ., Waurin Ponds, 3217, Australia
SO Analytical Chemistry (1983), 55(12), 1934-9
AB With a sq. wave superimposed onto a staircase potential ramp the technique of sq. wave polarog. (voltammetry) is shown to be capable of producing data which enables sq. wave, C. c., a.c., pulse, and other polarograms (voltammograms) to be obtained from a single expt. The method of data acquisition and the large no. of methods of data presentation highlight the close similarities of many polarog. techniques rather than differences more normally discussed in the literature. The ability to obtain the response for a range of polarog. techniques from a single expt. with microprocessor-based instrumentation leads to a highly efficient approach to anal. and kinetic investigations using polarog. and voltammetric methods.

L13 ANSWER 48 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 97:79493 CA
TI Transient electrochemical techniques in liquid chromatography with microprocessor-based instrumentation
AU Anderson, J. E.; **Bond, A. M.**; Heritage, I. D.; Jones, R. D.; Wallace, G. G.
CS Div. Chem. Phys. Sci., Deakin Univ., Waurin Ponds, 3217, Australia
SO Analytical Chemistry (1982), 54(11), 1702-5
AB The use of transient electrochem. techniques such as pulse, a.c., or square wave voltammetry in liq. chromatog. with electrochem. detection is aided by incorporation of inexpensive microprocessor-based instrumentation. Construction of microprocessor-based instrumentation interfaced to 2 com. available systems and stand alone units is described. Applications to the detn. of steroids, surfactants producing tensammetric waves, and inorg. species demonstrate the increased scope and nature of detns. possible with the microprocessor-aided instrumentation. Advances presented include the simultaneous recording of ≥ 5 chromatograms on different time scales with different sensitivities and the recording of complete current-voltage curves at all points in time as required for electrode processes producing tensammetric responses.

L13 ANSWER 49 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 97:46508 CA

TI Theory of digital **alternating current** polarographic techniques
AU Anderson, J. E.; Bond, A. M.
CS Div. Chem. Phys. Sci., Deakin Univ., Waurin Ponds, 3217, Australia
SO Analytical Chemistry (1982), 54(9), 1575-8
AB In the technique of digital a.c. polarog., a digital step function sine wave is applied to the cell rather than an analog sine wave. By modification of existing theory for step functional changes in potential, a theory for reversible systems can be obtained. The theory enables the effect of the no. of steps in the digital sine wave to be examd. and results are compared with conventional a.c. theory. The theory indicates the no. of steps in the digital sine wave is important in detg. the magnitude of the a.c. Phase angle relations are affected by the no. of steps as well as the point in time at which current measurements are made during the potential steps. Exptl. data for both fundamental and 2nd harmonic responses confirm the theor. predictions.

L13 ANSWER 52 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 96:26325 CA

TI Variable-amplitude pseudo-derivative pulse polarographic model for reversible nonfirst-order electrode processes. Application to mercury electrochemistry

AU Bond, A. M.; Hanck, K. W.

CS Div. Chem. Phys. Sci., Deakin Univ., Geelong, 3216, Australia

SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1981), 129(1-2), 89-101

AB This technique has the anal. advantages of differential pulse polarog., but the absence of d.c. terms makes the theory considerably simpler. As part of the work to extend the range of theory available in pulse polarog., a general theory for reversible non-1st-order reactions, strictly applicable to variable-amplitude pseudo-deriv. d.c. or pulse techniques, and to an excellent approxn. in differential pulse polarog. is presented. Application to the redn. of HgX_2P_2 (X = halide and P = tertiary phosphine) is presented. Here, HgX_2P_2 undergoes a reversible, 2-electron redn. involving a 4th-order process. The theory is also extended to demonstrate the presence of the exchange reaction: $\text{HgCl}_2\text{P}_2 + \text{HgI}_2\text{P}_2 = \text{HgClIP}_2$. Such phenomena are usually studied by NMR spectroscopy, but electrochem. techniques can also be an extremely valuable tool for studies in this area and may often be applied where NMR is inapplicable because of inadequate soly. or paramagnetism, etc.

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L13 ANSWER 53 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 95:69862 CA

TI Digital **alternating current** polarography with microprocessor-based instrumentation

AU Anderson, J. E.; Bond, A. M.

CS Div. Chem. Phys. Sci., Deakin Univ., Waurin Ponds, 3217, Australia

SO Analytical Chemistry (1981), 53(9), 1394-8

AB The technique of digital a.c. polarog. is described. In this technique, a small amplitude digital sine wave is applied to the cell instead of an analog sine wave. This signal is obtained from a microprocessor-based function generator and data acquisition system. Assuming that the 36-step sine wave produces a response similar to that in conventional a.c. polarog.; current data are collected every 10° relative to the applied signal. By simulating the various electronic components found in conventional a.c. polarographs, phase-sensitive detection of fundamental and 2nd harmonics is also possible. A qual. comparison between the abs. current polarograms and the phase-sensitive fundamental harmonics is in excellent agreement with a.c. polarog. theory for a reversible system. Digital a.c. polarog. appears to be a viable intermediate between analog a.c. and fast Fourier-transform

a.c. polarog. owing to its relative simplicity.

- L13 ANSWER 56 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 91:99130 CA
TI Theory of a.c. differential pulse polarography - a waveform for simultaneously obtaining d.c., a.c. and pulse polarograms
AU Bond, A. M.; Grabaric, B. S.; Jones, R. D.; Rumble, N. W.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, 3052, Australia
SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1979), 100, 625-40
AB Since the waveform is a linear combination of d.c. differential pulse polarog. and sinusoidal a.c. polarog. the possibility of obtaining a wide range of electroanal. responses at different time domains is considered. Advantages in anal. and kinetics investigations are discussed. Exptl. data for redn. of Cd in 1M NaCl and Zn in 1M KCl (pH 3.0) are presented. For the latter system the drop time and temp. dependence reveal anomalous behavior showing the model of a quasi-reversible electrode process is inadequate.
- L13 ANSWER 57 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 90:114322 CA
TI Correction for background current in differential pulse, **alternating current**, and related polarographic techniques in the determination of low concentrations with computerized instrumentation
AU Bond, A. M.; Grabaric, B. S.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Analytical Chemistry (1979), 51(3), 337-41
AB Modern electroanal. techniques, such as differential pulse and a.c. polarog., can be used to accurately det. concns. of electroactive species at 10⁻⁷M concn. levels, or below, provided the background current can be cor. for. By using computerized instrumentation, a quadratic least squares fit of data removed from the faradaic peak current of interest is shown to provide a general method of predicting the base line over all of the required potential range. Since no theor. assumptions are involved in the calcn., contributions from residual O levels or other trace impurities are included in the background prediction and correction procedure, and the method is applicable to a wide range of techniques and conditions. Results are presented for the detn. of Cd in the 10⁻⁸-10⁻⁶M range in 1M NaCl, and data at these very low concn. levels are generally superior to those obtained by storing a polarogram of the blank in memory and subsequently subtracting the result from test solns.
- ~~L13~~ ANSWER 59 OF 123 CA COPYRIGHT 2003 ACS on STN
~~AN~~ 89:97071 CA
TI A.C. cyclic voltammetry: a digital simulation study of the slow scan limit condition for a reversible electrode process
AU Bond, Alan M.; O'Halloran, Roger J.; Ruzic, Ivica; Smith, Donald E.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1978), 90(3), 381-8
AB Rate laws presented to date for anal. of a.c. cyclic voltammetric data have invoked the so-called slow scan limit approxn. which requires that $\Delta E \omega \gg v$, where ΔE and ω are the applied a.c. potential amplitude and angular frequency, resp., and v is the d.c. potential scan rate. To provide a more useful guideline for the exptl. than this qual. condition, a pure digital simulation approach was used to compute the a.c. cyclic time domain waveform for a reversible process under small amplitude conditions. The a.c. content of this waveform is extd. by the digital FFT algorithm. More quant. limitations are concluded for the slow scan limit rate laws describing the

fundamental and 2nd harmonic responses (approx. 128 a.c. cycles/d.c. cyclic sweep and 512 a.c. cycles/d.c. cyclic sweep, resp.) and an interesting prediction is made that the latter limitations can be relaxed further by a current waveform subtraction strategy, to as low as ~16 a.c. cycles/d.c. cyclic sweep for the fundamental and 2nd harmonics. The cycles/sweep values assume 1 triangular wave potential scan of ± 200 mV is encompassed.

L13 ANSWER 60 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 88:179358 CA

TI Simultaneous measurement of the in-phase and quadrature components of the signal in a.c. polarography using multiplier circuitry

AU Blutstein, H.; Bond, A. M.; Norris, A.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1978), 89(1), 75-81

AB The use of multiplier circuitry is shown to provide a simple way of simultaneously measuring the in-phase and quadrature (phase-angle) components of the signal in a.c. polarog. When used with previously developed circuitry an extremely versatile instrumental approach is available for detecting the second harmonic and intermodular (frequency difference) components in addn. to the in-phase and quadrature components of the fundamental harmonic.

L13 ANSWER 61 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 88:112495 CA

TI **Alternating current** polarography using a non-linear, potential-time ramp to generate the d.c. potential

AU Bond, A. M.; Grabaric, B. S.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1978), 87(2), 251-60

AB During the history of the technique a considerable amt. of research was undertaken to alter and improve the a.c. aspects of the expt. but relatively little endeavor was made to modify important d.c. component. The use of a nonlinear potential vs. time ramp of the kind used in normal pulsed polarog. is considered as an alternative way of generating the d.c. component of the a.c. polarog. expt. and runs are compared with the usual approach in which a linear d.c. potential vs. time ramp. is used. Results for several electrode processes are presented and differences introduced by using the pulsed d.c. waveform considered. Results clearly demonstrate that the range of a.c. polarog. method. can be usefully extended by varying the nature of the d.c. component of the expt.

L13 ANSWER 62 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 88:67210 CA

TI Fundamental and second harmonic **alternating current** cyclic voltammetric theory and experimental results for simple electrode reactions involving amalgam formation

AU Bond, Alan M.; O'Halloran, Roger J.; Ruzic, Ivica; Smith, Donald E.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Analytical Chemistry (1978), 50(2), 216-23

AB The technique of a.c. cyclic voltammetry is extended to treat the case involving the simple electrode reaction, $O + ne \rightarrow R$, in which the electrode product forms an amalgam. Rate laws are presented for the a.c. cyclic response at a stationary Hg sphere electrode. Exptl. data for several redox systems give excellent agreement with theor. predictions for both Nernstian and non-Nernstian conditions. The fundamental and 2nd harmonic a.c. cyclic responses both prove to give sensitive measures of the

amalgam and sphericity effects, and complement conventional d.c. cyclic measurements.

L13 ANSWER 63 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 88:43143 CA
TI On-line FFT faradaic admittance measurements. Application to a.c. cyclic voltammetry
AU Bond, Alan M.; Schwall, Richard J.; Smith, Donald E.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1977), 85(2), 231-47
AB A measurement approach is described and data are presented which demonstrate the ability to effect a.c. cyclic voltammetric measurements with the on-line digital FFT (Fast Fourier Transform) approach to faradaic admittance data acquisition. The equipment utilized enables complete faradaic admittance spectra to be obtained at an effective spectrum acquisition rate of 10 s⁻¹, so that the d.c. potential range encompassed by a typical cyclic wave can be encompassed with adequate resolu. in the Edc dimension in ≥6 s, approx. The instrument features dynamic, computerized measurement and compensation of the non-faradaic ohmic resistance and double-layer capacitance contributions to the acquired total cell admittance. Measurements with quasi-reversible systems yield the expected faradaic admittance and phase angle responses over quite a generous bandwidth. Applications to Hg and Pt electrodes are illustrated.

L13 ANSWER 66 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 85:171085 CA
TI Phase-selective intermodular **alternating current** polarography and voltammetry
AU Blutstein, H.; Bond, A. M.; Norris, A.
CS Dep. Inorg. Chem., Univ. Melbourne, Melbourne, Australia
SO Analytical Chemistry (1976), 48(13), 1975-9
AB A versatile instrumental approach in intermodular **alternating current** polarog. was developed which enables phase-selective measurement to be made at variable frequency differences and amplitude. A phase-selective detector acting as a balanced modulator is used to generate the required ref. signal by multiplying the 2 sine waves frequencies. The sum frequency terms are filtered out from the response leaving the frequency difference or intermodular component as the ref. signal. The development of the new instrumental approach has allowed the theor. response for a range of intermodular polarog. and voltammetric techniques to be verified. A comparison with phase-selective 2nd harmonic a.c. polarog. with equiv. instrumentation shows that the background current is relatively large in the intermodular method. On this basis, and for instrumental reasons, it is therfor concluded that 2nd harmonic techniques are superior to the related 2nd-order intermodular methods.

L13 ANSWER 69 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 84:186617 CA
TI Fundamental and second harmonic **alternating current** cyclic voltammetric theory and experimental results for simple electrode reactions involving solution-soluble redox couples
AU Bond, Alan M.; O'Halloran, Roger J.; Ruzic, Ivica; Smith, Donald E.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Analytical Chemistry (1976), 48(6), 872-83
AB A quant. theor. and exptl. study of fundamental and 2nd harmonic a.c. cyclic voltammetry is presented for a simple electrode reaction involving soln.-sol. redox forms, and rate control by diffusion and/or heterogeneous charge

transfer. Rate laws are presented for the a.c. cyclic responses at stationary planar and spherical electrodes, and their predictions surveyed. Exptl. data for several redox couples with widely varying k_s values are found to confirm detailed predictions of the theory. Particular attention is paid the situation where the d.c. process is non-Nernstian, under which conditions variation of the kinetic status of the d.c. process leads to some interesting and useful effects in the a.c. observables. Some novel bases for characterizing the heterogeneous charge transfer rate parameters are revealed for the cyclic a.c. expt. It is concluded that fundamental and 2nd harmonic a.c. cyclic voltammograms both complement and, in many cases, provide more sensitive and convenient insights about the electrode reaction than widely-used conventional (d.c.) cyclic voltammetry.

L13 ANSWER 71 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 83:199443 CA

TI Use of pulsed direct current potential to minimize charging current in **alternating current polarography**

AU Bond, A. M.; O'Halloran, R. J.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO **Analytical Chemistry** (1975), 47(12), 1906-9

AB The use of a pulsed d.c. potential rather than the usual linear ramp in a.c. polarog. is described. By measuring the difference in a.c. in the presence and absence of the pulse, subtraction of the charging current from the readout can be achieved. An approx. theor. treatment of the technique, called differential pulse a.c. polarog. is presented and expt. verified. Considerable advantages over normal a.c. polarog. are exhibited. Particularly when coupled with phase selective detection, almost complete discrimination against charging current is possible, even at high frequencies and with concns. well below $10^{-6}M$. A convenient readout shape results, with the peak-to-peak current parameter being linearly dependent on concn. While considerably more theor. and exptl. research is required for a thorough evaluation of this technique, results demonstrate that the use of a pulsed d.c. potential ramp can make an important addn. to a.c. polarog. techniques. Comparison with d.c. differential pulse polarog. is also presented to show the complementary nature of the a.c. and d.c. methods.

L13 ANSWER 72 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 83:185485 CA

TI Measurement of higher harmonics with a lock-in amplifier. Phase-selective and other forms of sinusoidal, sawtooth, square wave, triangular wave, and white noise **alternating current polarography**

AU Bond, A. M.; Flego, U. S.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO **Analytical Chemistry** (1975), 47(13), 2321-4

AB Block and circuit diagrams are given for the app. (assembled from com. components) used in the title measurements. Phase-selective a.c. polarograms on $5 \times 10^{-4}M$ Cd [7440-43-9] in 1M HCl showing the fundamental, 2nd, 3rd, and 4th harmonics are given. The various title wave forms are depicted along with the various Cd polarograms resulting therefrom. All measurements were made with a 3-electrode system using pos. feed-back circuitry to minimize the iR drop effects. The ref. electrode was Ag/AgCl (satd. NaCl) and Pt wire was used for the auxiliary electrode.

L13 ANSWER 75 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 82:92531 CA

TI Comparison of fundamental and second-harmonic a.c., and normal, derivative, and differential pulse linear-sweep and stripping voltammetric methods

AU Bond, A. M.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Analytica Chimica Acta (1975), 74(1), 163-75
AB Linear-sweep and stripping a.c. and pulse voltammetric methods were compared for a variety of electrodes and electrode processes. Each of the linear-sweep techniques is readily used systematically because, in contrast to d.c. linear-sweep voltammetry, the theory for reversible electrode processes is basically analogous to that for polarog. at a dropping Hg electrode. In stripping anal., some departures are found at a hanging Hg drop electrode because of spherical diffusion effects. For reversible electrode processes, the limits of detection for a.c. and pulse methods are comparable. However, a.c. methods offer advantages over pulse methods in discriminating against irreversible electrode processes and permit the ready use of faster scan rates. Pulse methods are more sensitive for irreversible electrode process. Normal pulse polarog. is particularly favorable in minimizing undesirable phenomena arising from adsorption or deposition of material on electrodes.

L13 ANSWER 76 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 82:49227 CA

TI Instrumental advantages obtained with short controlled drop-time a.c. polarography

AU Bond, A. M.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Talanta (1974), 21(6), 591-600

AB The performance of short drop-time a.c. polarog. was examd. in detail, and found to be better than that for natural drop-times in almost every respect. Uncompensated resistance terms are smaller and potentiostat stability is improved. In addn., faster potential scan rates and more rapid data acquisition are possible. A variation of the drop-time over ≤ 3 orders of magnitude is possible and this, coupled with excellent instrumental performance, should offer considerable scope in studies of electrode kinetics.

~~L13~~ ANSWER 77 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 82:23683 CA

TI Short drop time, second harmonic **alternating current** polarography. Minimization of adsorption and amalgam effects

AU Blutstein, H.; Bond, A. M.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1974), 56(2), 177-86

AB The use of short controlled drop times ≥ 50 msec in phase-selective 2nd harmonic a.c. polarog. is discussed. From the anal. point of view, apart from the smaller current per unit concn. advantages are gained in many areas over the use of gravity controlled natural drop times. For example, some systems suffering from severe inhibition due to adsorption give close to the normal response at short drop times. The Cd [7440-43-9]-tribenzylamine [620-40-6] system is used to illustrate this aspect. The theory applicable to short drop times appears to be substantially the same as for the conventional method, except that for electrode processes forming amalgams, asymmetry arising from spherical diffusion terms is minimized. Use of a.c. cyclic voltammetry confirms that short drop time scale a.c. techniques do minimize amalgam formation effects, but other unexplained phenomena still remain.

L13 ANSWER 78 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 81:180597 CA

TI **Alternating current** linear sweep and cyclic voltammetry at a dropping mercury electrode with phase-selective fundamental and second harmonic

detection

AU Blutstein, H.; Bond, A. M.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Analytical Chemistry (1974), 46(13), 1934-41
AB The anal. application of phase-selective a.c. linear sweep voltammetry (fundamental and 2nd harmonic) with scan rate synchronized to a dropping Hg electrode is considered. Com. available instrumentation was adapted to provide the technique, and the theor. response was obtained over a wide range of operating conditions for both the faradaic and charging current components. The techniques combine the advantages of fast scan rates (up to 200 mV/sec used in this work), extremely high reproducibility (better than 1% at the 10⁻⁶M level), and linear calibration curves over a wide concn. range. With the 2nd harmonic method, flat base lines were obtained despite the growth of the Hg drop during the scan duration, and this would appear to be the preferred technique. At the high frequencies necessitated by the condition $\Delta E_{wt} \ll vt$, slight nonideality leads to sloping base lines in the fundamental mode. Comparison with the d.c. method shows considerable advantage of a.c. techniques with respect to resolution. Cyclic a.c. voltammograms can also be obtained at the dropping Hg electrode with the same instrumentation.

~~L13~~ ANSWER 87 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 80:103185 CA
TI Cyclic fundamental and second harmonic a.c. voltammetry with phase-selective detection
AU Bond, A. M.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1974), 50(2), 285-91
AB A cyclic a.c. voltammetric technique is proposed whereby an alternating potential is superimposed onto triangular d.c. filtering out the d.c. and recording the a.c. as a function of the d.c. potential resembles linear sweep voltammetry except that at a selected point the potential ramp is reversed and the potential is scanned in both pos. and neg. directions. Advantages of this technique, when combined with phase-selective detection, are described, esp. the read-out of the current-voltage curve. It is suggested that this method can be coupled to variable d.c. scan rate or use variable frequency.

L13 ANSWER 90 OF 123 CA COPYRIGHT 2003 ACS on STN
AN 79:132593 CA
TI Analytical application of high frequency, phase-sensitive short controlled drop time **alternating current** polarography
AU Bond, A. M.
CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia
SO Analytical Chemistry (1973), 45(12), 2026-31
AB Usual polarog. methods are not specific for the interference-free direct detn. of elements in complex mixts. nor are they sufficiently rapid to be competitive with other techniques. Rapid, short controlled drop time, high frequency, 3-electrode, phase-sensitive a.c. polarog., using high frequencies (500-1000 Hz) instead of the usually low frequencies (10-100 Hz), discriminates against unwanted electrode processes. Because the dissoln. medium of many samples is often acidic, removal of O is unnecessary. The use of short controlled drop times and fast scan rates of potential provide a time scale close to that for at. absorption spectrometry, linear calibration curves over several orders of magnitude of concn., ready checks on interference, and other useful features. The detn. of Sn is compared with results obtained by other labs. using at. absorption

spectrophotometry, x-ray fluorescence, and colorimetric methods. The usefulness of the method is demonstrated also for the detn. of U, Pb, and Cu.

L13 ANSWER 99 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 77:121505 CA

TI Rapid, phase-sensitive, three-electrode alternating current polarography

AU Bond, A. M.; Canterford, D. R.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Analytical Chemistry (1972), 44(11), 1803-7

AB Previously, short controlled drop times have been employed with considerable advantage in a.c. polarog. to permit faster scan rates of potential and short recording times. The possibility of using 3-electrode phase-sensitive detection with this rapid a.c. polarog. technique was investigated. Theoretical relations derived for natural drop time a.c. polarog. can be extended to the rapid a.c. method. Thus, with 3-electrode phase-sensitive instrumentation, excellent discrimination against the charging current is still obtained at short controlled drop times. The degree of discrimination under rapid conditions was better than with natural drop time phase-sensitive a.c. polarog. This behavior was particularly evident at high frequencies. With the rapid phase-sensitive a.c. technique, Cu(II) and Cd(II) could be detected down to the $5 \times 10^{-7}M$ to $1 \times 10^{-6}M$ level. The introduction of phase-sensitive readout to the rapid a.c. technique, therefore, provides a considerable improvement to results reported previously with non phase-sensitive instrumentation. Indeed, the technique appears to be highly attractive in many aspects, having the advantage of permitting fast scan rates, and thus short anal. times, while maintaining excellent discrimination against the charging current. This behavior is in contrast to other polarog. techniques where the use of short drop times necessarily results in a lowering of ability to discriminate against the charging current, and therefore a loss in sensitivity.

L13 ANSWER 110 OF 123 CA COPYRIGHT 2003 ACS on STN

AN 75:147097 CA

TI Principles and applications of a.c. and d.c. rapid polarography with short controlled drop times

AU Bond, A. M.

CS Dep. Inorg. Chem., Univ. Melbourne, Parkville, Australia

SO Journal of the Electrochemical Society (1971), 118(10), 1588-95

AB The techniques of a.c. and d.c. rapid polarog. employing short controlled drop times and fast scan rates of potential are discussed in detail.

Particular emphasis is given to comparing the methods with conventional polarog. in electroanal. applications. The shapes and main characteristics of both a.c. and d.c. polarograms are essentially the same as in conventional polarog. Any differences encountered generally arise from the different time scales of the 2 techniques. Reversible, quasi-reversible, and irreversible electrode processes are considered. In anal. applications, the rapid methods are superior to conventional polarog. because of the considerable time saving gained from the fast scan rates of potential. The reproducibility is also marginally better. In fundamental studies, such as in the characterization of electrode processes, rapid polarog. is also shown to be particularly useful. The analogy of behavior akin to a streaming Hg electrode is considered, as are other phenomena and characteristics introduced by having short controlled drop times. The technique can be given wider usage than presently accorded.

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